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THE CONSTRUCTION AND EVALUATION OF A SELF-INSTRUCTIONAL PROGRAM IN RUSSIAN.

BY- SALTZMAN, IRVING J.
INDIANA UNIV. FOUNDATION, BLOOMINGTON

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A SELF-INSTRUCTIONAL PROGRAMED COURSE IN RUSSIAN WAS CONSTRUCTED. FIFTEEN THOUSAND PRINTED FRAMES AND 306 TAPES WERE PREPARED FOR USE BY HIGH SCHOOL OR FIRST-SEMESTER COLLEGE STUDENTS. THE MATERIALS WERE USED TO (1) PROVIDE A RESEARCH TOOL FOR STUDYING SECOND LANGUAGE INSTRUCTION AND ACQUISITION AND (2) YIELD INFORMATIO ABOUT THE DEVELOPMENT OF EXTENSIVE PROGRAMED SELF-INSTRUCTION COURSES. MATERIALS FOR THE FIRST HALF OF THE COURSE (WRITING RUSSIAN SCRIPT) WERE FIELD TESTED AT THE UNIVERSITY OF WASHINGTON, SEATTLE. MATERIALS FOR THE SECOND HALF OF THE COURSE, DEALING WITH ORAL TRANSLATION OF PRINTED RUSSIAN, WERE TESTED AT INDIANA UNIVERSITY, BLOOMINGTON. FIVE BRIEF STUDIES OF SECOND LANGUAGE LEARNING WERE PERFORMED WITH A SECTION ON THE WRITING OF RUSSIAN SCRIPT. THESE STUDIES INCLUDED (1) REVIEW COMPARED WITH NONREVIEW, (2) ORDER OF PRESENTING AUDIO AND VISUAL MATERIALS, (3) COMPARISONS BETWEEN RESULTS ACHIEVED WITH PICTORIAL AND NONPICTORIAL FORMS OF THE MATERIALS, (4) COMPARISONS OF CONTROLLED REST PERIODS VERSUS REST PERIODS TAKEN AT STUDENT OPTION, AND (5) COMPARISON OF VARIOUS MODES FOR USING LINED AND UNLINED PAPER TO PRESENT THE PROGRAMED INSTRUCTIONS. THE EVALUATION DID NOT REVEAL SIGNIFICANT DIFFERENCES BETWEEN THE COMPARED GROUPS. (WN)

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The Construction and Evaluation of a Self-Instructional Program in Russian

IRVING J. SALTZMAN

Title VII Project Number 658

National Defense Education Act of 1958
Grant Number 712133

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Introduction

Although this is the official final report of NDEA Title VII Grant No. 712133.01 -- The Construction and Evaluation of a Self-Instructional Program in Russian -- work on the problem with which this project was concerned will not terminate with this report. This is, of course, not an unexpected state of affairs; most scientific investigations continue long after the original problems have been solved. However, the remark is particularly appropriate in this instance because our project is primarily concerned with the development of a lengthy, college level, self-instructional programmed course in Russian and a characteristic of every good programmed course seems to be that its development is virtually never completed. Each student who seriously and conscientiously goes through a self-instructional program is a potential source of advice for modifying and improving the program even after it presumably has been put into its final form. Like the proverbial woman, a programmer's work is never done.

The expected end-products of our project, as stated in the original proposal in 1961, are: "(1) An automated program which has been tested and found capable of teaching the first semester course in Russian to high school and college students as effectively as it is now being taught by the usual classroom procedures. (2) Information which can be used to guide the development of other self-instructional programs. (3) A technique with which to explore the many factors which influence the learning and teaching of second languages."

This report will be an account of the way we have gone about our task of pursuing these goals. It will consist of seven sections. Section I will contain a detailed description of the contents of the programmed Russian course which we have developed. This section will be addressed primarily to the language teacher who might have an interest in discovering exactly what our course covers and how it compares in subject matter with other first semester courses. Section II will contain a description of the laboratory where the program was tested, the physical make-up of the program, the equipment that was used, and the subjects and the way they used the program in the lab. Section III will contain a description of the procedures used by the programmers in the development, evaluation, revision and further testing of the program. Section IV will contain a description of the program qua program. It will be concerned primarily with the characteristics of the course as a programmed self-instructional device. Section V will contain a description of the program as a modern foreign language course. It will present a detailed description of the manner in which the student was taught the various skills which constitute second language proficiency. Section VI will describe several experimental studies which were carried out during the course of the project using a small section of the program. And Section VII will contain some remarks of the principal investigator regarding the development of extensive self-instructional programmed courses.

When we began the development of our programmed course in 1961, it was our intention to prepare a course which would cover the same material that was covered in the first semester course in Russian at

Indiana University. Such a procedure, we believed, would have the following obvious benefits: (1) It would ensure us of a programmed course which was equivalent in content to a typical college course, and (2) it would provide us with convenient control or comparison groups at Indiana University with which to compare and evaluate our programmed course. Dr. John Beebe, one of the co-investigators on the project, at the start of the project was in charge of the beginning courses in Russian at Indiana University and was, therefore, very familiar with the first semester course. The writer was also familiar with the course, having taken it twice as a student in the period between 1957 and 1960. Unfortunately for our purposes, however, after our project had been underway for about a year, Dr. Beebe took on other departmental responsibilities and relinquished his role as supervisor of the beginning Russian courses. The new supervisor, as might have been expected, gradually effected major changes in the course, both in content and in pedagogical approach. We had already reached a point where it was impossible to alter our program, even if we had wished to do so. But, by that time, we had come to realize that it would be impossible to match our program exactly with the original Indiana University course. In order to construct what we considered to be the most efficient and effective self-instructional course, we had to add and delete material from the original course model. For these reasons, then, the programmed course which we developed is not identical in content with any one specific course now being taught. If it is, it is accidental and the particular course is not known to the writer. Nevertheless, our

course is undoubtedly quite similar in content to many first semester college courses. From the description which follows below in Section I the reader may be able to assess for himself how closely the program approximates the "typical" college course.

I. Course Content

The program consists of both taped and printed material. There are 306 separate tapes varying in running time from five minutes to forty minutes with an average of approximately twenty minutes. There are slightly less than 100 hours of taped material in all (97.5 hours). Most students listen to parts of the tapes more than once, however, so the typical listening time of the students may substantially exceed 100 hours. The printed material is in programmed textbook form and consists of approximately 15,000 frames. The printed material and the tapes cover the same content. The text emphasizes reading, writing and spelling; the tapes emphasize listening and speaking. Both the text and tape require the student, working alone in a partially soundproofed booth, to translate phrases and sentences from Russian to English and from English to Russian. In using the program the student repeatedly switches back and forth between using the textbook and the tape; occasionally he is required to refer to the text while listening to the tape.

The program contains 266 lexical items. Roughly they are divided into grammatical categories as follows: 124 nouns, 63 verbs and 79 other items, primarily pronouns and adverbs, but including other parts of speech. This tally does not count the several different inflectional forms of the items; it includes only the base

forms, e.g., the nominative, singular form of nouns or the infinitive forms of verbs. A tally of items including inflected forms would multiply the 266 items many times over since the program teaches and requires the student to practice and use: 1) the forms for the nominative, genitive, accusative and prepositional cases, 2) singular and plural forms, 3) the forms for all three genders, 4) the infinitive forms of verbs, 5) the forms for the present, past and future tenses of verbs for all persons, 6) the imperative mood of verbs and 7) the perfective and imperfective aspects of verbs.

The following is a detailed account of the contents of our course. The material is arranged in the order in which it is introduced in the program. All the material is presented in the program twice, once in text form and once on tape. This double presentation will not be indicated in the listing which follows. In the usual procedure the student hears and learns to recognize items first in their spoken form. Then he mimics and practices speaking the items. Next he reads them and learns to spell them. And, finally, he uses them in translations both orally and in writing. Then he moves on to the next set of items. Later he reviews all the items. This is the procedure that is followed with all new lexical items whether the items are single words or long phrases or sentences which involve complicated grammatical structures.

<u>Book I</u> and associated tapes. Approximately 13 hours of study time.

1. Pronunciation of the names of the letters of the Russian alphabet in sequence.
2. Recognition of printed Russian letters, upper and lower cases.

3. Writing Russian letters in script; writing Russian words and sentences.
4. Test (written). The student writes the alphabet from memory in upper and lower case forms and writes, in script, five long printed Russian sentences.

Book II and associated tapes. Approximately 17 hours of study time.

1. Pronunciation of consonant-letters. (Voiced, voiceless, hard and soft pronunciations.)
2. Pronunciation of vowel-letters. (Under the different stresses.)
3. Pronunciation of simple Russian sounds; reading printed Russian words.
4. Simple facts of grammar. (Capitalization, punctuation, omission of articles, omission of the verb "to be" in the present tense, genders.)

Book III and associated tapes. Approximately 13 hours of study time.

1. Vocabulary. (Meaning, pronunciation and spelling and where appropriate, gender and conjugation.) Russian words with the following approximate English translations: table, chair, pencil, student (m.), book, student (f.), teacher (f.), wall, blackboard, coffee, window, letter, word, place, teacher (m.), notebook, door, field, here, where, uncle, but, party, name, rifle, right here, yes, no, not, there, what, here is, and or but, lesson, magazine, house, newspaper.
2. Demonstrative adjective-pronouns: this, that (all genders).
3. Personal pronouns.

4. Use of the familiar and polite forms of "you".
5. Nominative case.
6. Vocabulary -- common expressions: Hello, Good morning, Good afternoon, Good evening, How are you?, Fine, Thanks., Fair, Very well, and you?, Good-bye, What's this?, It's a _____, How do you write in Russian, _____?, How do you say in Russian, _____?, How do you write in English, _____?, How do you say in English, _____?
7. Possessive pronoun-adjectives. (First and second persons, singular and plural, all genders.)

Book IV and associated tapes. Approximately 10 hours of study time.

1. Distinction between the particle and the pronoun-adjective for "this".
2. Spelling rules: restrictions on the letters which can follow gutteral and hushing consonant-letters.
3. Interrogative sentences; interrogative pronoun "who".
4. Interrogative, possessive adjective-pronoun, "whose" (all genders).
5. Distinction between the words for "and" and "but".
6. Adverbs of location.
7. Vocabulary: father, sister, aunt, family, mother, daughter, writer, woman, brother, pen, feather, son.
8. Present tense of verbs; conjugations.
9. Vocabulary -- verbs (infinitive and six forms): read, know, give, take, write, speak, remember, ask for, see.

Book V and associated tapes. Approximately 20 hours of study time.

1. Accusative case. Pronunciation and spelling of the accusative case forms of all relevant items: nouns, pronouns, adjectives.
2. Genitive case. Use with objects of negative verbs.
3. Genitive case. Pronunciation and spelling of the genitive case forms of all relevant items: nouns, pronouns, adjectives.

Book VI and associated tapes. Approximately 25 hours of study time.

1. Vocabulary: both ... and, neither ... nor, no one, nothing, who.
2. Review of material since last test.
3. Test (oral and written). The following are samples which were selected from the written test: (Student writes his Russian translations of English sentences and his English translations of Russian sentences) 1. My brother sees our uncle. 2. We don't remember your son, but he remembers us. 3. Where is our teacher? There she is -- over there. 4. Are you taking that magazine? No, I'm not taking that magazine. She is taking it.
   The oral test requires the student to translate sentences like the above, orally.
4. Vocabulary: to do, to sit, to love, to dine, to drink, to work, to be, always, often, rarely, when, never, sometimes, at home, one's own.
5. Possessive adjective-pronouns. Third person, singular and plural.

Book VII and associated tapes. Approximately 20 hours of study time.

1. Genitive case. Use for possession.
2. Idiomatic use of the verb "to have".

3. Past tense. All verbs reviewed.
4. Introduction to verb aspects. Imperfective verbs, aspect pairs, prefixed perfective verbs.
5. Vocabulary: yesterday, still, long time, already. Perfective verbs: write, do, dine, read, ask for, see, drink.

Books VIII through XVI and associated tapes. Approximately 125 hours of study time. This material is still in programmed booklet form.

1. Derived imperfective verbs: describe, copy, sign.
2. Vocabulary -- verbs (present and past): live, take, give, tell.
3. Derived aspect-pairs. (present and past)
4. Stress shift in negative, past tense forms of the verbs "to be" and "to live".
5. Vocabulary: (Nouns: meaning, gender, pronunciation, spelling; nominative, genitive and accusative cases. Verbs: meaning, conjugation, infinitive, six forms, past, present, perfective, imperfective): town, country, park, store, school, restaurant, building, garden, forest, Don River, Crimea, floor, time, genius, army, today, all, not yet, every, night, to forget, everything.
6. Prepositional case: Prepositions: in, into, on, onto, at, about, of.
7. Prepositional case: nouns, pronouns, adjectives, all genders.
8. Variant forms of prepositions.
9. Expressions of the duration of time.
10. Review of material covered since last test.
11. Test (oral and written).

Samples: 1. Do you have the pencil? No, she has it. 2. The

teacher's chalk is not on the chair, but on the table. 3. We sometimes dine and drink all night in the garden at home. 4. The whole village has already read the book about them and their political party.

12. Vocabulary: only, tomorrow, also, problem, exercise, mistake, paper, question, dictionary, calendar, lecture, a little, student (m.), conversation, wife, arm chair, because, apartment, street, kitchen, plant, factory, concert, then, meeting, post office, station, railway station, work, theatre, university, how, so, why, wine, to ask, to receive, to understand, to finish, to begin, to repeat, to reply.
13. Process verbs: to stand, to lie, to sleep, to listen, to observe.
14. Future tense -- all verbs reviewed.
15. Distinctions between conjugations; consonant mutations in verb forms.
16. Imperative Mood.
17. Vocabulary: clothes, towel, ocean, truth, thing, mirror, tree, pig, shelf, Pole, American, German, little girl, girl, business, week, month, dance, knife, comrade, physician, violinist, department, ruble, museum, tramway, professor, address, voice, train, color, husband, friend, person, people, children, money, how much, several, much, little, please, many.
18. Plural forms. All nouns, pronouns, adjectives reviewed, four cases.
19. Indefinite numerals.
20. The verb "to be" and negative constructions.
21. Test (oral and written). Samples: 1. My daughter's teachers talked

about these textbooks at the meeting yesterday. 2. I'll sign all those documents and then finish answering the mail. 3. Our husbands will inquire about that man's business when they are at work today. 4. Don't repeat those words when you are at your aunts'!

II. Laboratory, Students, Program and Equipment

Each student worked in our self-instruction lab in an individual, partially soundproofed booth which was equipped with a tape recorder and a desk. Five booths and recorders were available at all times. The lab consisted of a small air-conditioned room which was just large enough to contain the booths, several book cases and a clothes-tree. The lab was adjacent to the office of the principal investigator and was connected to it by a common foyer. Each student had a key to the lab and came to study on his own personal, flexible schedule. He kept a data sheet up to date with a daily record of his study time, progress, comments, questions and suggestions. Except for accidental contacts, the students and the principal investigator communicated primarily with each other about the program through notes left in the students' folders. However, since the principal investigator's office was adjacent to the lab, there was ample opportunity for personal, face-to-face interaction. The students varied greatly in the extent to which they sought personal contact with the principal investigator. The schedules of some of the students were such that they usually came to the lab when it was empty and they did all of their studying in the lab alone. Some of the students, on the other hand, almost invariably came when there were other students at work

in the lab.

Each time that a student came to the lab to work on the program he continued forward from the point that he had reached on his previous visit. Occasionally, at his own discretion, a student would review previously studied material. This was more likely if a long period intervened since his last visit to the lab. Although the students were advised to spend approximately two hours per day, five days per week working on the program, they varied greatly as to amount of time per session, number of sessions per week, total time per week, the regularity with which they worked and the rate at which they were able to progress. The students were volunteers who, for the most part, learned about the program and its availability from periodic news releases in the local newspapers and on the local radio station. In these releases the project was described in general terms and volunteer subjects were solicited. The other students learned of the program through personal contacts. Most of the students were of college age or older. A few high school students were used. All the students at the start appeared to be highly motivated to learn Russian and anxious to try the "new method". Not all the students who started on the program continued to the end. Some stopped after one or two sessions; many continued for extended periods before dropping out; and some continued straight through to the end of the program or as far as it had been developed. The usual reason given for terminating was "lack of time". Almost all of the students said that they enjoyed working on the program.

Some of the students, after they had devoted about 50 or 60 hours to working on the program, were invited to continue in the program as paid subjects; they were paid a nominal hourly fee for their time. These subjects were selected by the principal investigator on a subjective basis depending on his opinion of their seriousness of purpose and estimated potential value as a source of useful commentary regarding the program. The arrangement was mutually satisfactory. The students were pleased to be paid for what they professed they wanted to do anyway and the principal investigator felt adequately recompensed from the belief that he was decreasing the likelihood that they would drop out and thereby fail to provide the needed information about the middle and final parts of the program. Unfortunately, however, paying the students was not completely effective in ensuring their cooperation; some of them, in spite of the rather pleasant circumstances, nevertheless, dropped out before reaching the end of the program. Perhaps this should have been expected, since the period of time involved was usually more than five months and the payment was only nominal. However, another unfortunate consequence ensued. Although an attempt was made to keep secret the fact that some of our students were being paid, several of those who were not being paid managed to discover the fact and subsequently dropped out, presumably, at least in part, because of their resentment of the apparent discrimination.

In the early stages of the development of the program, we scheduled our subjects so that only one student at a time was working on a particular section of the program. The next subject who went through the

same part of the program would do so only after there had been an opportunity to make modifications, if they were considered to be necessary, on the basis of the previous student's comments and the programmers' deliberations thereof. Student drop-out later forced us to abandon this procedure and students were started whenever they were available.

As the program neared completion, several students were hired to go through the entire program right from the beginning. In addition to these paid and non-paid subjects just described, three members of the Indiana University-based Annual High School Science Summer Institute "enrolled" in our programmed course and devoted from 25 to 30 hours per week for six consecutive weeks to working on the material. Also, one 13-year old eighth-grade girl, the principal investigator's daughter, studied approximately 100 hours on the program over an eight month period and completed more than a third of the course. It was necessary for her to repeat some sections of the course more than once before advancing to the next sections. Approximately 300 different students worked on the program for varying lengths of time at various stages of the development of the program.

As the program was being written, it was typed on 4 x 6 inch cards, one frame per card. Two holes were punched on one of the short edges of the cards and packs of about 150 cards were joined together by pairs of 2-inch metal rings to form programmed booklets. The booklets, as well as the individual cards, were numbered so that each frame could be easily referred to and easily removed from the booklets and

replaced. Only one copy of the program was prepared in this form. During the early testing stages of the program, only one copy was necessary; the students were scheduled so that conflicts did not occur. A need for duplicate copies of the program did arise near the end of the project as the program became ready for field testing.

When the first half of the program was considered to be in "final" shape, that is, after several students had been through that part of the program and no further modifications were contemplated, multiple copies of the material were prepared in programmed textbook format. Seven programmed textbooks were required to encompass this first half of the course. Each of the seven books, except for the first one, is approximately 100 pages long and contains approximately 1000 frames. The first book, which teaches the student to write Russian script, has 258 pages. It has been published separately by the McGraw-Hill Book Company; it is titled: WRITING RUSSIAN SCRIPT. The second half of the program still exists as one copy only; it consists of 57 stacks of 4 x 6 inch cards with approximately 150 cards per stack. Students working on the program currently start with the programmed textbooks and switch to the programmed booklets at the end of the seventh book. The programming style is the same for the books and the booklets, but some minor changes were made to eliminate redundant instructions in the programmed texts between some successive frames when they were printed on the same page.

The tape recorders that we have been using are standard, moderately priced recorders. However, they do have the following two features which are not very common: they require the use of ear phones

and they are constructed so that the student can listen to one track -- the master track -- while recording his own voice on the other track -- the student track. Both tracks can then be heard simultaneously on playback, that is, the student can hear both the model and his own imitation of the model. Subsequent student recordings erase only the previous student's recording and leave the master track untouched. Although this sound-on-sound feature of our recorders might appear to have great merit for our purposes, we have, nevertheless, decided not to make use of it. The early versions of our tapes did require the student to make and listen to his own recordings, but in the last revision of our program we altered the tapes so that our students now do not make recordings of their own voices. We decided against using the sound-on-sound feature for the following reasons: (1) After the novelty of hearing themselves speak Russian had worn off, our students reported that they found that listening to their own recordings was extremely boring. They felt that the time involved, which was substantial, could be more profitably spent doing other things. 2) The recordings that the students made were about five or ten minutes long. This meant that they had to wait about five or ten minutes after making a specific response before they could hear it on the tape, i.e., they had to complete their recording and then start listening from the beginning of their recording to hear any particular response. There was a delay in feedback of information, a delay of reinforcement, therefore, of about five or ten minutes after each response. Consequently, listening to their own recordings was not very profitable for the students. There was too long a delay between a response and the feedback about

its accuracy to promote efficient learning. In addition, the delay period between the response and the feedback was filled with competing responses which undoubtedly further vitiated the effects of the feedback. 3) Most standard, moderatly priced tape recorders do not have the sound-on-sound feature. In order to make it possible for our program to be used in as many high school and college language laboratories as possible, and since it was of dubious pedagogical value, we decided to eliminate the use of the sound-on-sound feature from our program.

III. Program Development

At the start of our project Dr. Beebe prepared a tentative outline of the course that we planned to program. It was originally divided into units or lessons, each one of which was approximately equivalent to the amount of material usually covered in a week by a typical college class at Indiana University. Each lesson included a presentation of several grammatical constructions and some lexical items. The lexical items were selected primarily on the basis of whether or not they could exemplify the grammar being introduced. As the program was developed, thetentative divisions into lessons disappeared. This was a consequence of the shifting, adding and eliminating of material which was found to be necessary in writing the program. As mentioned earlier, primarily for reasons of expository clarity, a substantial amount of material which was not originally scheduled for inclusion had to be added and some of the material which had originally been selected for the course had to be cut out. The course, as it now exists, is divided into three approximately equal sections, each section

requiring about 70 or 80 hours of study time. A detailed review section and a written and oral examination follow each third of the program.

The method used initially in writing the program was basically one of trial and error. The techniques which were finally adopted were gradually worked out during the course of the project. About a dozen different individuals with varying degrees of advanced training and ability in Russian were employed at various times during the course of the project in one or more of several different capacities. The principal investigator, by means of demonstration and discussion, instructed each new member of the project staff in the techniques of programming. Individuals who joined the project several months or more after it had started found it very helpful to examine carefully all of the program that had already been written. The principal investigator wrote the first part of the program and it was used as a model to illustrate the desired format. The personnel, for the most part, worked on a part-time basis an average of approximately 25 hours per week. Not all the members of the project performed equally important functions. The following different kinds of tasks had to be performed in developing and testing the program: 1) Selecting and arranging the course content. 2) Converting the course content into statement-format. 3) Writing the questions about the statements. 4) Typing (Russian and English). 5) Writing the tape scripts. 6) Making the tape recordings. 7) Editing the texts. 8) Editing the tape scripts. 9) Supervising student use of the program. 10) Evaluating students' comments and test performances for use in guiding the revision of the

program. 11) Revising and rewriting the textual material and the tape scripts. 12) Converting the booklet format to the textbook format. 13) Proof-reading (Russian and English). 14) Conducting experimental investigations with the program. 15) Field testing the program.

Several different individuals were used to record the English on the tapes. Only one person, however, Walter Oussenko, spoke the Russian on the tapes. Mr. Oussenko was born in April, 1938 in Leningrad. Although he did much traveling with his family in Europe during the first four or five years of his childhood and was exposed to several different languages, the language which he used in the home was Russian. He attended Russian schools until he was 10 years old. Then, for five years in Belgium, he attended French schools. In 1953, at the age of fifteen, he immigrated with his mother to the United States and lived in Philadelphia for five years. While living in Philadelphia he completed three years of high school and graduated. In Philadelphia he continued to speak Russian in the home and he belonged to several Russian speaking social groups. After graduating from high school, he served in the armed forces. When he made the tape recordings for our program, he was an undergraduate student in linguistics at Indiana University. He describes his Russian as "a mixture of Moscow and Leningrad dialects."

The programmers worked together in two rooms, one large room and a small adjoining room. The rooms were furnished with desks, bookcases and typewriters. The tapes were recorded in the Indiana University Language Laboratory. The following is a step-by-step description

of the way in which the program was developed. First, The Writing Program, which had been previously developed by the principal investigator, was tested with groups of volunteer subjects. The Writing Program taught the students the names of the letters in the Russian alphabet in sequence, how to write them in upper and lower case form and how to connect them to write words. On the basis of the students' performances on a terminal test and on the basis of their comments and suggestions made during and after studying the material, The Writing Program was revised and retested several times. It was during this period, while The Writing Program was being tested, that most of the techniques for writing and testing the program were worked out and adopted. Several different formats for the programmed textbooks were tried and discarded with The Writing Program as the testing medium. While this was going on, we started the programming of the next part of the course. Dr. Beebe's material was rewritten by the programmers in statement format, that is, the material was broken down into small units, each unit consisting of a few sentences which presented one or two simple facts. The amount of material that was worked on as a block for programming was approximately the amount of material usually covered in one meeting of a conventional class. After the block of material was rewritten as a series of simple statements, Dr. Beebe examined them for accuracy. Revisions and additions were often required and suggested at this point. The exchange between Dr. Beebe and the programmers was repeated until mutual satisfaction was reached with regard to accuracy and clarity of expression. Then questions relating to each of the statements were written by the programmers. The exact

number of questions for each statement varied with the nature of the statement and its estimated difficulty. Attempts were made to arrange the questions for each statement in a graded sequence of difficulty. The statements themselves, of course, were arranged in a planned, logical sequence, also. Each statement was typed on a separate card as was each question about the statement. The answers to the questions were typed on the backs of the question-cards. The backs of the statement-cards were left blank.

In the course of the project, as feedback from the students became available, a standard number of questions, arranged in a fixed order, was decided upon and adopted in programming each of the various common classes of items. For example, a fixed, sequential pattern of questions was adopted for programming every new noun, or every new verb. The use of the standard sequence of questions greatly facilitated the mechanics of writing the program. Once we had decided on the pattern for programming new nouns, for example, mimeographed form-cards were prepared which were simply filled out, mechanically, for each new noun that was introduced into the program. Two kinds of questions were used, direct questions requiring written or oral constructed responses and two-choice, multiple-choice questions. The questions were usually arranged in a graded sequence which started with relatively easy-to-answer, multiple-choice questions, moved on to more difficult multiple-choice questions and ended with direct questions requiring constructed responses.

The tape scripts were written after the textual material had been programmed. The textual material was used as a model for writing the

tape scripts. The tapes covered the same content as the textual material except that they did not include duplicate explanations of the grammatical structures and they stressed the oral, rather than the written aspects of the language. Although the tape scripts were written after the textual material, the students always listened to the tapes dealing with new lexical items before they worked on the textual material dealing with the same items. Samples of both the textual material and the taped material can be found in Section V.

After the textual material was typed onto the cards, the cards were proof-read; and after the taped material was recorded, the tapes were checked against the scripts for accuracy and were timed. Then the program was tried out with volunteer subjects. On the basis of their comments and performances, the program was immediately revised, if needed. Then the revised program, with whatever newly completed material added, was tested again.

In the early stages of the project our students were instructed to keep records of their errors. Whenever they answered a question incorrectly, they were asked to indicate the item number and, wherever possible, they were to provide an explanation of the error. Our subjects, however, did not cooperate in this undertaking. They found it too troublesome and disruptive to stop to indicate where and why errors occurred, particularly when they felt that the errors clearly resulted from their own carelessness or inattention. But when an error occurred which they felt was the "program's fault", they seemed eager to point it out. Their cooperation enabled us to discover our typographical errors, wrong answers, accidental omissions, duplications,

inconsistencies, or unclear, misleading or incorrect statements. Their eagerness to help in this regard may have been due to the fact that the principal investigator provided a good deal of social reinforcement to the students for this behavior through written and verbal expressions of his gratitude. Later in the course of the project we stopped requesting the students to report all their errors and asked them only to make comments about the program, in general, and about specific items, in particular, when they felt that the information would be useful to the programmers in deciding upon possible modifications and revisions of the program. Students varied greatly as to the diligence with which they performed this task. As the programmers gained experience in writing the program, the incidence of isolated "poor" items decreased almost to zero. The suggestions that the students made in the late stages of the project were primarily of the kind that led to gross changes in the program, such as substantial reductions or increases in the number of questions dealing with entire sections of the course.

Four tests covering different parts of the program were prepared in order to enable us to evaluate the effectiveness of the various sections of the program. These same tests are now being used to assess the differences among individuals who work on the course. The first test comes at the end of The Writing Program and is a written test only. The other three tests, which come after approximately each third of the course, include both written and oral sections. The exact location of these tests in the program can be ascertained from Section I. The tests sample the behaviors which the program is designed to teach. They

require the students to demonstrate how well they can understand, speak, read and write the material that has been presented in the program. Decisions concerning whether, where, and how to revise the program were based on an examination of students' performances on these tests as well as on their comments and suggestions about the program.

For three reasons the first half of our program has been tested more extensively than the second half. First, we tested each part of the program as soon as it was written. We did not wait until the whole program was developed before we started testing. As a consequence, the earlier parts, completed sooner than the later parts, were able to be tested and revised repeatedly and they were almost already in final form before the very last parts were even written in first draft. The second reason is that it was impossible to test the second half of the program without retesting the first half in the process. Students must go through the complete program even when our interest is directed only or primarily to their performance on the second half of the program. Finally, students who drop out before completing the entire program, while providing information about the early parts of the course, which they complete, never provide any information about the later parts of the course, which they never reach. It is for the above reasons that we have, to date, duplicated only the first half of the program. The second half will be duplicated as soon as several subjects go through the complete program and the programmers, on the basis of the students' comments, suggestions and test performances, agree that no further revisions are advisable. At this writing,

no student has completed the entire program since its last revision. The first half of the program is currently being field tested at the University of Washington in Seattle where the principal investigator is spending the year on leave from Indiana University. Sixteen students have enrolled in the course. It is being offered along with several other self-instructional programmed language courses in the Informal (non-credit) Section of the Division of Continuing Education. The second half of the course, that is, the complete program, continues to be tested on an individual, volunteer basis in our Indiana University Self-Instruction Lab.

IV. Program Qua Program

Our program can be characterized as a modified linear program. It does not require any special devices for its use other than a standard tape recorder with a speed of 3 3/4 ips. A teaching machine is not required. The program requires overt constructed responses, both written and oral, as well as two-choice, multiple-choice responses. No fill-in type questions are included. The course exists in programmed textbook form and in programmed tape form. The tapes are prepared in the same programming style as the textual material. The texts emphasize the oral translation of printed Russian and the writing of Russian translations of printed English. The tapes emphasize the oral reading of printed Russian and oral translations both from English to Russian and from Russian to English. Although both the texts and the tapes present new lexical material, a given lexical item is always presented first on tape, where its proper pronunciation is emphasized, and then in the text, where its proper spelling is emphasized. Both the texts

and the tapes require the students to practice using the new items in typical grammatical constructions or patterns.

As mentioned earlier, only the first half of the program has been duplicated in programmed textbook form; the rest of the program is in programmed booklet form. The pages of the programmed textbooks are divided vertically into two equal columns. In using the programmed texts, the student reads down the left-hand column of a page, first, then the right-hand column, and then turns the page and does the same on the reverse side of the page, as he would in reading a regular, two-columned textbook; then he proceeds to the next page. The answer to each question in the program is placed immediately below the question. For the following reasons we believe that this procedure of dividing the page vertically into two columns and placing the answers to questions immediately below the question is a superior programming format than either one of the other two commonly used formats, the one where the answers are placed in a margin to the right or left of the question on the same page, and the one where the answers are placed in a margin on the next page. The former, single-column, vertically sequenced format is less economical of space than our format because it must provide the same frame height for an answer to a question as it does for the question, even though the question usually requires several lines of print and its answer, only one. Our format provides each question and each answer, independently, only as much height as it requires. For the same reason, the latter, page-to-page, horizontally sequenced format also is less economical of space than our format, and, in addition, it has other drawbacks. It requires that

all the frames be of the same, standard size and that the standard size be the size of the biggest frame. Not only is this characteristic wasteful of space, it also acts as an undesirable constraint on the writing of the program itself by setting a limit on the size of the frames. An additional disadvantage of this format is that it requires the student to do a great deal of page-flipping. In an early form of our program which used this page-to-page, horizontally sequenced format, our students were quite vocal about the aversive nature of the excessive amount of page-turning.

The student using our program can use a card or his hand to conceal the upcoming items in the program, as can the student of the single-column, vertically sequenced format. We have discovered, however, that most of our students, very soon, dispense with the use of either the cards or their hands as blinds. They apparently find it easy to learn not to look ahead until they are ready to see the next part of the program. This may be true of students using the single-column, vertically sequenced format, also.

Our program is completely self-instructional; it is designed to accomplish its purposes without the assistance or intervention of a live, as opposed to taped, teacher. It attempts to present the course content in a very deliberate, easy to comprehend, step-by-step fashion and it requires the student to answer questions to ensure that the material has been perceived accurately. It also requires the student to perform tasks using the material. The program is viewed, therefore, not merely as a means of presenting the material to the student in a form which will be easy to understand, but also as a means of

forcing the student to interact with the material so that he will learn to use it effectively. This dual function of our program should be recognized. We are concerned not only with a clear, easy to grasp presentation of our subject matter, as are all self-instructional programs, but we are concerned also with providing an opportunity for the student to practice or rehearse the proper use of that subject matter. We are interested in presenting the facts to our students not only so that they can learn to verbalize them, but also so that they can learn to use them effectively. One function of our program, then is to present the facts clearly. The other function is to require the student to practice using the facts appropriately. A student may require very little practice in order to learn from a clear, step-by-step presentation, the rule that, for example, the direct object of a negative Russian verb must be in the genitive case. But if he has to learn to come up quickly with objects in the genitive case in speaking Russian, and not just learn what the rule is, then he needs a substantial amount of practice using the rule. Our program attempts to perform both functions. It presents the facts clearly so that they are easily understood and it forces the student to do the practice which is necessary for developing the skills required for efficient use of the facts.

Because the program is completely self-instructional, during the construction of the program an effort was made to anticipate and eliminate every problem that a student, working alone without a teacher, might have. In order to use the program, students must be literate, familiar with English grammar, motivated to study Russian and coopera-

tive to the extent of doing what the program requires them to do. It is the intent of the program to free the student from the responsibility of deciding how much to practice or study the material. Every student is required by the program to do a certain minimum amount of practice. The amount of practice that the program originally required of every student was arrived at on an intuitive basis. The amount was altered later whenever it was considered advisable to do so, on the basis of student performances and recommendations.

The amount of practice that is necessary to promote a satisfactory level of performance varies, of course, from one individual to another, from one kind of material to another, and, undoubtedly, with many other factors. The ideal situation would be one where many different programs covering the same material were available and each student could have a program which matched his particular requirements. But until reliable techniques for assessing such individual requirements are developed and until it becomes practical to develop several forms of every self-instructional program, we must be satisfied with less than ideal solutions to the problem of individual differences. In this regard, our program, to the extent that it was possible to do so, was aimed at the typical or modal college student. We tried to construct a program which would require an amount of practice which would result in a satisfactory level of performance for most college students. We attempted to do this by requiring our students to do a little more than they would do if the decision of how much to practice were left completely up to them. Whether or not we were successful in this endeavor can be ascertained experimentally and we plan to undertake such experi-

mentation in the future. Fortunately, the programming style that we have developed for our course is one which is easily adapted for investigating this kind of problem.

We have called our program a modified linear program because we have departed from the typical linear format by separating our factual presentation frames, which we call statement frames, from our question and answer frames, which we call practice frames. This division corresponds with the dual function of our program discussed above. The statement frames present the factual material in a simple, clear, step-wise fashion; they never contain any questions. The practice frames contain questions about the material presented in the statement and require the student to perform tasks using that material. Several benefits derive from this separation of the presentation and practice functions of the individual frames. First, it makes it easy for the student who wishes to review specific parts of the course to do so quickly without reworking the program. He needs merely to reread the statement frames which cover the topics that he is interested in; he need not go through the practice frames again. The statements are easy to locate in the program since they are marked off from the practice frames by lines of asterisks which both precede and follow them. Also, the statement frames have all been collected in sequence in a separate book. This book of collected statement frames, even more easily than the program proper, can be used by the student for review purposes, particularly when extensive sections of the program are to be reviewed. A second benefit of this format is that the book of statements also can be used by any interested observer to gain a quick

overview of the program. This possibility does not exist with the usual linear format. The person who wishes to examine a course which is programmed in the typical linear format has virtually no choice but to go through the program, like a student.

A third advantage of the separation of statement and practice frames, and by far the most important one, is that it makes it possible for a programmed course to handle individual differences in ability in a very simple fashion. Bright or gifted students can move through the program at an accelerated pace by being allowed to skip some of the practice frames, but not skipping any of the statement frames, and consequently, not missing any of the course content. This kind of "branching" is not possible with the usual variety of linear program and constitutes a serious limitation of such programs.

Because we have separated the statement frames from the practice frames, the term "step-size" can be applied to our program in two ways, to the steps between successive statement frames and to the steps between successive practice frames. Minimal steps are used in both situations. A fact is introduced in the statement frame; then there is a graded sequence of questions -- minimal steps -- about the statement; and then the next statement -- minimal step -- is introduced, etc.

Some additional characteristics of our program worthy of comment are the following: 1) Our students are required to answer some of the questions in the program orally and some in writing. Since it is much quicker to <u>speak</u> answers than to <u>write</u> them, the program requires written answers only if the students can derive benefits from the writing. For this reason the program requires hardly any of the English

responses, but many of the Russian responses, to be written out. Requiring the students to write out their Russian responses affords an opportunity for reinforcing the correct spelling of Russian words.

2) Our multiple-choice questions contain only two choices, the correct answer and one incorrect answer. We decided on using the two-choice question over the more common four-choice or five-choice question on the basis of the following reasoning. We believe that it is a pedagogically sound and efficient practice in teaching students to make discriminations to require them to observe correct and incorrect instances of the items to be discriminated. As long as the correct item is immediately identified as the correct item, any adverse effects of allowing the student to view a "negative instance" are more than counterbalanced by the benefits derived from pointing up the difference between the items and identifying (reinforcing) the correct one. Granting the soundness of this position, the two-choice question should be a much more efficient way to effect the pedagogically desirable comparison than the four- or five-choice question. With four or five choices, students undoubtedly often fail to look at all the alternatives, especially when the correct alternative occurs early. As a consequence, therefore, not all the desired comparisons are made. To counteract this possibility, our program, rather than presenting one, four-choice question, presents three, two-choice questions, covering the same material. This has the double advantage of increasing the likelihood that all three comparisons will be made and of increasing by a factor of three the number of exposures and reinforcements of the correct item.

3) Our student is required to answer only one question per frame. For this reason he can check every answer immediately after he makes it; he never has to answer a second question before he can confirm his answer to the first. We attempt to adhere in every instance to this principle which we consider to be the basic principle of all programmed self-instruction, the principle of immediate feedback of information or reinforcement. This doesn't mean that all our answers are single words. Many of our practice frames require the student to write long sentences. But, other things being equal, rather than have one frame contain two separate questions, we prefer two separate frames with one question each. 4) In constructing our tapes we used the same format that we used in writing the programmed texts. We used both statement frames and practice frames, but there is a much higher proportion of practice frames to statement frames on the tapes than in the texts. In taping the practice frames, an important decision had to be made with regard to the amount of time that the student would be given in order to construct his responses, particularly his responses in Russian. One possibility was to leave an amount of time that was judged to be the amount of time that most of the students would, or should need. Another possibility was to leave just enough time for the student to stop the recorder. With the latter procedure, as soon as he turns off the recorder, the student composes his response, makes his response, and then turns on the recorder to confirm it. There are advantages and disadvantages with both techniques. With the former procedure, which is the one which we adopted, the student occasionally does not have enough time

to compose and make his response before he hears the correct answer and occasionally he has to wait a few seconds after he makes his response to hear the correct response. But with this procedure, the student is not only spared the onus of stopping and starting the recorder, which is hard on both the student and the recorder, but also, he is paced or guided by the program so that he learns to respond at a reasonably rapid rate. With the other procedure, although he will hear the master's pronunciation of the correct response only when he is ready for it, the student will not be automatically encouraged to respond at a reasonably rapid rate and may, as a consequence, not learn to respond rapidly.

V. The Program as a Language Course

In recent years in the teaching of foreign languages, there has been a de-emphasis of the reading and writing skills and an increase in emphasis on listening and speaking. To a large extent, this shift in emphasis reflects a change in the objectives of most language students. Today, for the most part, students want to learn to understand and speak the language. They are no longer satisfied with acquiring only a reading knowledge. But there appears to be more involved than a shift in interest on the part of the student. Many language teachers and linguists feel that the new audio-lingual methodology is the best way to teach a foreign language regardless of the students' reasons for studying the language. They believe that there should be an early emphasis on the aural and oral skills even with those students who admittedly seek only a reading knowledge. And the belief is widely held. Indeed, the Steering Committee for the

Foreign Language Program of the Modern Language Association of America in 1956 recommended to the profession that the elementary language course at all levels, from elementary school through college, should concentrate at the beginning on hearing and speaking foreign language. This advice may be sound; the language teachers and linguists who sincerely attempt to implement the recommendation may be well advised. Unfortunately, however, at the present time, objective, unambiguous experimental evidence to support the recommendation is lacking. So it is possible that the advice may not be sound; it is possible that the teachers and linguists are ill advised. It may well be that because of the growing, and in some ways, justified dissatisfaction with the old, traditional method of teaching foreign languages (with a reading-knowledge objective) there has been an uncritical acceptance of the new method. Although the new method with its new emphases may eventually prove to be the most efficient way to teach second languages, especially to young children, it is also possible that it may not. Indeed, the possibility exists that the more traditional method with its emphases on reading and grammar can be modified and improved -- by incorporating some of the features of the new technique -- so that it will not only be better than it was, but even better than the new audio-lingual method. The important thing, however, is to recognize that evidence supporting the new method is at present lacking and that there is, therefore, a great need for experimentation in this area. The use of self-instructional methods, I believe, will aid substantially in collecting the missing data.

The program that we have developed is neither purely traditional nor purely "new key". We have attempted to combine the two approaches and drive the benefits of both. In accordance with the audio-lingual approach, the first contact that our students have with every new lexical item is to hear it pronounced on the tape by a native Russian speaker. But then, in accordance with the traditional approach, after he learns to mimic the pronunciation of the item, he learns to spell it. Our students have a substantial amount of pattern-practice or structural drill, in accordance with the audio-lingual methodology, but they are not required to practice in a vacuum. They are taught the grammatical rules before they begin the pattern practice; they do not have to discover the rules through induction. Also, they do not substitute different items in the same pattern repeatedly, but they start each response with a new pattern. And they are required to do a large amount of translating, from Russian to English and from English to Russian, both orally and in writing.

The following account will contain a detailed description of the way in which the program attempted to aid the student in acquiring the skills which constitute second language proficiency.

Our program starts with a short, five-minute tape which teaches the student to recite the names of the first three letters of the Russian alphabet. Then the student works through the first 15 pages in the first programmed text and learns what these letters look like in print and how to write them in script. Then he listens to the next tape which teaches him to recite the next three letters in the alphabet. Following this tape the student returns to the text and

learns what these letters look like in print and how to write them in script. This process is continued until all 33 letters have been presented in blocks of three letters, both on tape and in the text. When the student completes the alphabet tapes and textual material, he is able to recite the Russian alphabet, recognize the printed forms of all the letters and write all the letters in script. The following is a copy of the third Alphabet Tape-Script.

"This is tape number three. The names of the first six letters in the Russian alphabet are: ah, beh, veh, gheh, deh, yeh. The next letter in the Russian alphabet after yeh is the letter yoh. The next letter in the Russian alphabet after yeh is the letter yoh. Is the letter which occurs in the Russian alphabet after yeh, yah? (Pause.) No, it is yoh. Is the letter which occurs in the Russian alphabet after yeh, yoh? (Pause.) Yes. Which of the following, the first or the second, occurs in the Russian alphabet after yeh, yoh - you? (Pause.) The first, yoh. Which of the following, the first or the second, occurs in the Russian alphabet after yeh, oh - yoh? (Pause.) The second, yoh. What is the name of the letter which occurs in the Russian alphabet after yeh? (Pause.) It is yoh.

The next letter in the Russian alphabet after yoh is the letter zheh. The next letter in the Russian alphabet after yoh is the letter zheh. Is the letter which occurs in the Russian alphabet after yoh, zheh? (Pause.) Yes. Is the letter which occurs in the Russian alphabet after yoh, shoh? (Pause.) No, it is zheh. Is the letter which occurs in the Russian alphabet after yoh, zeh? (Pause.) No, it is zheh. Which of the following, the first or the second, occurs in the Russian

alphabet after yoh, zheh - zhah? (Pause.) The first, zheh. Which of the following, the first or the second, occurs in the Russian alphabet after yoh, zheh - zeh? (Pause.) The first, zheh. What is the name of the letter which occurs in the Russian alphabet after yoh? (Pause.) It is zheh.

The next letter in the Russian alphabet after zheh is the letter zeh. The next letter in the Russian alphabet after zheh is the letter zeh. Is the letter which occurs in the Russian alphabet after zheh, zah? (Pause.) No, it is zeh. Is the letter which occurs in the Russian alphabet after zheh, sheh? (Pause.) No, it is zeh. Is the letter which occurs in the Russian alphabet after zheh, zeh? (Pause.) Yes. Which of the following, the first or the second, occurs in the Russian alphabet after zheh, zeh - zoh? (Pause.) The first, zeh. Which of the following, the first or the second, occurs in the Russian alphabet after zheh, zee - zeh? (Pause.) The second, zeh. What is the name of the letter which occurs in the Russian alphabet after zheh? (Pause.) It is zeh.

The first nine letters in the Russian alphabet are called: ah, beh, veh, gheh, deh, yeh, yoh, zheh, zeh. The first nine letters in the Russian alphabet are called: ah, beh, veh, gheh, deh, yeh, yoh, zheh, zeh.

In the following alphabetical sequence, starting with gheh and ending with zeh, the name of a letter may be mispronounced. If a letter is mispronounced, you give the correct pronunciation as soon as the sequence is completed. If the sequence is correct, say 'correct'. Gheh, deh, yah, yoh, zheh, zeh. (Pause.) Yeh. Now do the same with

the following sequences. Give the correct pronunciations of mispronounced letters or say 'correct'. Gheh, deh, yeh, yoh, zhah, zeh. (Pause.) Zheh. Gheh, doh, yeh, yoh, zheh, zeh. (Pause.) Deh. Gheh, deh, yeh, yoh, zheh, zeh. (Pause.) Correct.

In the following alphabetical sequence starting with gheh and ending with zeh, the name of a letter may be omitted. If a letter is omitted, you say it as soon as the sequence is completed. If the sequence is correct, say 'correct'. Gheh, deh, yeh, zheh, zeh. (Pause.) Yoh. Now do the same with the following sequences. Give the names of omitted letters or say 'correct'. Gheh, deh, yeh, yoh, zeh. (Pause.) Zheh. Gheh, deh, yoh, zheh, zeh. (Pause.) Yeh. Gheh, deh, yeh, yoh, zheh, zeh. (Pause.) Correct.

Recite the names of the first nine letters of the Russian alphabet along with the tape. Ah, beh, veh, gheh, deh, yeh, yoh, zheh, zeh. Ah, beh, veh, gheh, deh, yeh, yoh, zheh, zeh. This is the end of Tape Number 3. Continue on page 32 of your text."

When the student returns to the programmed text he finds that the first statement frame dealing with the letter yoh is the following: "The next letter in the Russian alphabet after the letter yeh is the letter yoh. The name of this letter is pronounced like the English letters yo in the word New York." Following this statement frame is a sequence of seven practice frames concerned with the order of the letters in the alphabet. For example, the third practice frame asks: "Is the letter preceding yoh in the Russian alphabet yah or yeh?" The seventh practice frames asks: "What is the name of the letter which follows yeh in the Russian alphabet?"

The next statement frame shows and describes how the capital letter yoh is printed. The following statement frame does the same for the small, printed letter, yoh. Six practice frames follow each of these statement frames. Each of the questions requires the student to indicate which of two printed letters is the correct capital or the correct small letter yoh. The student is told that he must decide on an answer to each question and that he then must check it immediately for accuracy.

The next two statement frames describe and show how the capital and small letter yoh are written in script. There are seven practice frames associated with each statement frame. The practice frames require the students to indicate which of two written letters is the correct way to write the capital or small letter, yoh. Also, the student is asked to make copies of the correct letters.

The next five statement frames and their associated practice frames deal with the next letter, zheh, in exactly the same way as the preceding five statement frames dealt with the letter yoh. And the letter which follows zheh, zeh, is dealt with in exactly the same way in the following five statement frames. After the names of the three letters and their printed and written forms are introduced by the 15 statement frames and their associated practice frames, the next six statement frames deal with the problems of connecting the letters properly to form words. One statement frame and six practice frames are devoted to each of the three capital letters and to each of the three small letters. The statement

frames describe how the connections are made and provide examples to illustrate the connections. The practice frames require the students to indicate which one of a pair of words has the component letters correctly joined. They also require the students to write printed groups of letters in script.

Immediately following these frames, with no additional statement frames, there is a series of 39 practice frames which provide additional exposure of all the familiar letters in both their written and printed forms. The students are shown sequences of letters and asked whether the letters are in their correct alphabetical order. The order, of course, may be correct or incorrect. Also, the students are asked to identify which of two letters is the one which precedes or follows a particular letter in the alphabet. In any of these frames, the letters may be printed or written, caps or small letters. The last two practice frames in this sequence ask the student to write all the letters he has learned in alphabetical sequence, as small letters and as capital letters. The student is never asked to print any of the letters.

The first eleven tapes are similar to the one described above; each tape presents three letters and reviews all the previous ones. The tapes gradually increase in length as the amount of material to be reviewed increases. The textual material which follows each tape also is similar to the textual material described above. Again, there is a gradual increase in the number of practice frames. After all 33 letters are presented in the first 11 tapes and the associated textual material, the student listens to a 12th tape and then works

on a final section of textual material. The 12th tape asks the student to look at a table in the textbook which contains all the letters in a scrambled, numbered sequence in printed and written, upper and lower case forms. He is asked to say the name of a letter, then hear it pronounced on the tape, then say the next letter, etc. Following this tape there are 196 practice frames reviewing all aspects of the writing program. The frames were constructed after a study was made of the kinds of errors our students made during the early tests of the program. The last section, therefore, provides an important review of the most difficult or troublesome parts of The Writing Program.

After the student completes The Writing Program, he is taught by tape the different ways that each of the consonant-letters is pronounced. There are 21 consonant tapes in all. Between successive tapes the student works in the text, primarily on writing exercises. The following is a sample of the consonant tapes.

"This is consonant tape number seven. Let's consider the letter deh. Deh is a voiced consonant-letter and forms a consonant-letter-pair with the voiceless consonant-letter teh. Let's first examine the sound of the letter deh when it has a hard-voiced pronunciation. When it has a hard-voiced pronunciation, the Russian letter deh sounds like the English letter dee in the English word 'dot'. Listen to the following list of utterances. Each one contains the letter deh. It has a hard-voiced pronunciation in each instance. (14 utterances with deh in either initial or medial position.)

"Now let's consider the Russian letter deh when it has a soft-voiced pronunciation. When it has a soft-voiced pronunciation, there is no close English approximation of the Russian sound. Remember, when a consonant-letter has a soft pronunciation, the English "y"-sound is started at the same time as the consonant-sound, not after it. Listen to the following list of utterances. Each one contains the letter deh. It has a soft-voiced pronunciation in each instance. (12 utterances with deh in either initial or medial position.)

"Now listen to the following list of utterances. Each one contains the Russian letter deh. Sometimes it has a hard-voiced pronunciation and sometimes it has a soft-voiced pronunciation. As soon as you hear an utterance, say, out loud, whether the pronunciation of the letter deh is hard or soft. You respond by saying "hard" or "soft". (14 utterances with hard and soft deh, mixed, in initial or medial position.)

"Now you will have an opportunity to practice saying hard and soft voiced deh. Utterances containing the letter deh will be spoken three times each, with enough time after each pronunciation for you to mimic it. Let's start now. Each time that you hear an utterance, you say it. (9 utterances with hard and soft deh, mixed, in initial or medial position.)

"This is the end of consonant tape seven. Please stop the recorder and rewind this tape."

After the student completes the consonant tapes, he listens to 23 vowel tapes. Between successive vowel tapes the student works

in the programmed text and learns some simple facts about Russian grammar, punctuation, and capitalization. When he completes the vowel tapes, he is able to read simple Russian words. The following is a sample of the vowel tapes; it is the 8th vowel tape.

"This is tape number 29: Pronunciation of the Russian letter, oh, stressed. Let's look at the Russian letter oh. When it is stressed, the Russian letter oh has only one pronunciation. When it is not stressed, it has two different pronunciations. We shall concern ourselves first with the stressed pronunciation.

"When it is stressed, the Russian letter oh sounds similar to the English letter oh in the English word "ore". It never sounds like the English letter oh in the English word "wrote" or the English word "cot". Nor does it have the glide that the English letter oh usually has. It remains unchanged from beginning to end, unlike the English oh in "wrote", which glides toward the English letter yoo in "up", or the English letter oh in "ore", which glides toward the English a in "sofa". This is one of the most difficult parts of Russian pronunciation for Americans -- learning not to glide in pronouncing the Russian letter oh.

"Listen to the following utterances. Each one contains a stressed oh. (12 utterances with oh in medial position.)

"Now listen to the following pairs of utterances. The first one in each pair contains a stressed oh; the second does not. (12 pairs of utterances.)

"Now listen to the following pairs of utterances. The first one in each pair contains a stressed oh. The second one may or may

not contain a stressed oh. As soon as you hear each pair of utterances, say out loud whether or not the two are the same. If they are, say 'yes'; if they are not, say 'no'. Try to respond before you are told the correct answer. (10 pairs of utterances, five identical and five different, mixed order.)

"Now listen to the following list of utterances. Some of them contain a stressed oh; some do not. As soon as you hear an utterance, say out loud whether or not it contains a stressed oh. If it does, say 'yes'; if it does not, say 'no'. Try to respond before you are told the correct answer. (20 utterances, 11 with stressed oh, 9 without, mixed order.)

"Now you will be given an opportunity to pronounce some utterances which contain a stressed oh. The utterances that you will pronounce are printed on page A58. Each utterance in the list will be pronounced on this tape three times with enough time in between for you to pronounce the utterance each time that you hear it. As soon as you hear an utterance, you read it out loud. (16 utterances.)

"Now you will be given an opportunity to pronounce the same utterances without hearing them pronounced by the model before you pronounce them. The procedure that we shall use is the following. You will be asked to pronounce utterance number one. After you have had an opportunity to read it out loud, you will hear it pronounced by the model. Then you will say it once more. Then you will be asked to pronounce utterance number two. After you pronounce it, you will hear it and say it once more, and so forth.

"Let's start now. Pronounce utterance number one. (16 utterances.)

"This is the end of Tape Number 29. Please stop the recorder and rewind."

After the student completes the 23 vowel tapes and the associated textual material, he listens to a series of four vocabulary tapes. The tapes teach him the correct pronounciation and meaning of the new items. Each tape presents about five items. After approximately every 15 items (3 tapes), there is a review tape covering those 15 items as well as many previous items. A sample of the vocabulary tapes follows.

(Section A) "This is vocabulary tape number three. Refer to the list of vocabulary words in your book while listening to the first part of this tape. Look at word number 11. It is pronounced as follows: ___, ___, ___. It means window. The word, ___ is a neuter noun. In pronouncing the word ___, notice that the stress is on the last syllable, and that the stressed oh does not glide into an "ah" or an "oo" sound. It is not ___, and not ___, but ___. Notice also that the first vowel is an initial, unstressed oh, so it is pronounced like an initial, unstressed Russian ah, like the English letter a in "father", only shorter in length: ___.

(Section B) "Now listen to the following pairs of Russian utterances. The first utterance in each pair is the correct pronunciation of the Russian word for window, ___. The second utterance in each pair is a mispronunciation. The first pronunciation is correct, the second is not. (6 pairs of utterances.)

(Section C) "Now listen to the following pairs of Russian utterances. One utterance in each pair is the correct pronunciation of the Russian word for window, ___. The other is not correct. As soon as you hear a pair of utterances, say out loud which one is the correct pronunciation. Respond by saying, "the first correct" or "the second correct". Try to respond before you are told. (5 pairs of utterances.)

(Section D) "Now listen to the following list of Russian utterances. As soon as you hear each utterance, notice whether or not it is the correct pronunciation of the Russian word for window, ___. If it is, say 'right'; if it isn't, say 'wrong'. Try to respond before you are told the correct answer. (10 utterances, five correct.)

(Section E) "Now mimic the correct pronunciation of the Russian word for window, ___. The word will be spoken three times with enough time in between for you to mimic the correct pronunciation. ___, ___, ___. What is the Russian word for window? (Pause.) It is ___.

"Now look at word number 12. (The same procedure was repeated for the Russian words for letter, word, place, teacher (male).

(Section F) "Now you will be asked to read all five words one at a time. As soon as you pronounce a word, you will hear it pronounced by the model. Then you will say the word once more. Let's start now. Pronounce number 11 . . . 15.

(Section G) "Do not refer to your vocabulary list for the remainder of this tape. You may close your book. Russian words will

now be read to you one at a time. As soon as you hear a word, you give its English meaning. (Each of the five words was presented three times in a mixed order.)

(Section H) "Now English words will be followed by pairs of Russian words, one of which will be the correct translation of the English word. As soon as you hear the words, you say which of the two Russian words is the correct translation. Pronounce the correct translation out loud and then repeat it after the model. Try to respond before you are given the correct translation. (Each of the five words was presented three times in a mixed order.)

(Section I) "Now some English words will be read to you one at a time. As soon as you hear an English word, you give its Russian translation, and as soon as you hear the model, you say it again. Try to respond before you are told. Make your response out loud. (Each of the five words was presented three times in a mixed order.)

"This is the end of vocabulary tape number three."

The review tapes, which usually come after every third tape, typically have two sections. In the first section, the student gives the English translations of the 15 Russian words; in the second section, he gives the Russian translations of the same English words. Each word is presented in a mixed order three times in Russian and then three times in English.

Later in the program, after the student is familiar with cases other than the nominative, the format of the vocabulary tapes is altered slightly to present the oblique case forms. Section B is omitted and a new section presenting and reviewing the new case forms

is added between Sections F and G. Each time that a new case is introduced in the program all the relevant previous items are reviewed with their new case endings in special declension tapes.

In the early part of the program, each time that a new verb is introduced, the infinitive form and every one of the six present tense forms is treated as an independent, new addition to the vocabulary. Later in the program after the past and future tenses have been presented, only three or four of the present tense forms, systematically selected over groups of verbs, are treated as independent items. The new tense forms replace the forms that are dropped. When the past tense is introduced in the program, all the previous verbs are reviewed in special verb tapes.

In addition to the vocabulary tapes, which introduce new lexical items, reading-and-translation tapes are used to give the student guided practice in reading and translating, both from English to Russian and from Russian to English. A sample reading-and-translation tape follows.

"This is reading-and-translation tape number 27. Adverbs. Look at Section 1 on page E91. Each sentence will be presented three times for you to mimic it. Let's start now. (12 sentences, each containing an adverb, are read by the model, three times each with enough time after each for the student to mimic or read it.)

"Now pronounce each of these sentences again, once before you hear the model, and again after you hear the model. (The same 12 sentences.)

"Listen to the Russian translations of the following English sentences. Then when the English sentences are repeated, you give the Russian translations before the model does. Then mimic the model. Keep your book closed during this section. (Six new sentences.)

"Now open your book to page E91 and look at Section 2. Translate each sentence into Russian. Then repeat each translation after the model. (5 new sentences.)

"Translate the following Russian sentences into English. Let's start now. (The same five sentences as above, in mixed order.)

"This is the end of reading and translation tape number 27."

It is hoped that the preceding descriptions and samples of our program will reveal the pedagogical techniques that we used to teach our students to understand, speak, read and write Russian at the level of a student who has successfully completed a first semester college course in Russian. It should be apparent that the first thing that we do is train our students to discriminate between the correct and the incorrect Russian pronunciations of a model. First we train their ears. Then, after they are able to make correct judgments of the model's pronunciations, we expect them to use the skill they have acquired to evaluate and shape their own pronunciations. Most of our students, as determined by their performances on both written and oral achievement tests, have been able to perform as expected. Through a process of differential reinforcement of successive approximations we bring the students to the point where the desired behaviors occur and can then be further strengthened by

additional performance and reinforcement. Since we wish to teach our students to read, write, speak and understand Russian, our program requires our students to do all these things -- to read, write, speak and translate spoken and written Russian -- and it reinforces them repeatedly for good performances.

VI. Experimental Studies Using The Writing Program

The following is a brief description of five experiments which were performed during the course of the project. The Writing Program, in various stages of its development and in different formats, was used as the content material. The 12 tapes were not used in all the experiments; when they were used, they were not always used as they are now, i.e., as described in Section V. The subjects, except for those in Experiment III, were 18 years old or older. The subjects in Experiment III were all bright high school students who were run in the summer between their junior and senior year.

Experiment I. Review vs. Non-Review: Two groups of 10 subjects each worked approximately one hour per day on the program until they completed it. One of the groups was required to start each daily session with a brief review of the material learned in the previous session; the other group was not required to review the previous day's material. The results indicate neither beneficial nor detrimental effects of the review. Although the Review Subjects spent from five to ten minutes per day reviewing the material, their total time to complete the program was not greater than the Non-Review Subjects. The Review Subjects were able to go through the new material, which included some of the previously learned material, faster than the

Non-Review Subjects. Further, the performances of the two groups on a terminal writing test did not differ.

Experiment II. The Order of Presentation of Audio and Visual Materials: Three groups of 12 subjects each worked on the program five hours per day for two days. On the third day they worked until they completed the program and then were given written and oral (taped) tests. The three groups were treated as follows: Group I listened to all the taped material in The Writing Program before they started on the programmed text material. This group learned to recite the Russian alphabet before seeing any of the letters. Group II completed all the programmed text material before they listened to any of the taped material. This group learned to write Russian script before hearing any of the names of the letters pronounced on the tapes. Group III had the taped material integrated with the programmed text material. This group heard the way the first three letters were pronounced, then learned to write them, then heard how the next three letters were pronounced, and then learned to write them, etc. (This is the procedure which we use now.) An analysis of the results of this study revealed that although there were no significant differences among the three groups on the final written and oral performance tests, Group III took significantly less time ($p=.05$) than the other two groups to complete the program. (Group I took 11 hours and 45 minutes, Group II took 12 hours and 11 minutes and Group III took 10 hours and 34 minutes.) An integrated audio-visual approach appears to be the most efficient approach of those tested. Correlations between scores on the written

and oral tests and 1) scores on the Carroll-Sapon Modern Language Aptitude Test and 2) scores on achievements tests taken after 18 weeks of intensive study of Russian (in a different program) were not significantly different from zero.

Experiment III. Pictorial vs. Non-Pictorial Forms of the program: Two groups of 15 subjects each were given copies of The Writing Program to take back to their living quarters to work on independently, at their own rates. The taped part of the program was not used in this study. One group of subjects received the standard form of the programmed text. The other group received copies of the program which were modified to include drawings of objects calculated to aid the student in learning to write the Russian letters. Professor Henry Bern of the Indiana University School of Education, a co-investigator on the project, was responsible for the development of these pictures. The subjects kept their own time records. After they completed the program, they were given a written test and then were asked to fill out a questionnaire which sampled their reactions to the program. An analysis of the results of this study showed that there were no significant effects of the pictures on either time to complete the program or on the final performance scores. However, the study raised several interesting questions. These subjects, who worked on the program away from the laboratory, took more time to complete the program than a comparable group run earlier in the lab. Also, their reactions to the program were less enthusiastic than those of the subjects who were run in the lab. These results, of course, are by no means conclusive,

but they do suggest important variables for future systematic study.

Experiment IV. Free vs. Controlled Rest Periods. Two groups of 33 subjects each worked on The Writing Program for three consecutive days, three hours on day one, six hours on day two, and as long as they needed to complete the program on day three. As soon as they completed the program, all subjects were given a written test. The taped material was not used in this study. The subjects in Group I were required to take a 10-minute rest break, as a group, after every hour of work on the program. The subjects in Group II were allowed to take rest breaks, as individuals, whenever they felt that they needed them. The two groups were compared in the following ways: (1) total time spent working on the program, (2) total time spent in rest periods, (3) scores on written performance tests, and (4) time required to take the written performance test. None of the differences between the group means was significant.

Experiment V. Lined vs. Unlined Writing Paper: Sixty-three subjects were divided into four groups. The subjects worked on The Writing Program for three consecutive days, four hours on day one, six hours on day two, and as long as they needed to complete the program on day three. As soon as they completed the program, all the subjects were given a written test. The subjects listened to the 12 tapes in the following way: (1) the first six tapes at the start of day one, (2) tapes 7 to 11 at the start of day two, and (3) tape 12 as soon as they reached page 208 in the program on day three. The first 11 tapes were played to all the subjects at once as a group; tape 12 was played on an individual basis as the subjects required it. Group I (N=17)

used lined paper to write on while working on the program and on the final test; Group II (N=15) used unlined paper in both situations; Group III (N=14) used lined paper during the program and unlined paper on the test; and Group IV (N=17) used unlined paper during the program and lined paper on the test. No significant differences were found on the final test as a result of the different treatments.

VII. General Remarks Concerning Programmed Instruction

As a consequence of having spent a large part of the last three years working on the development and testing of our self-instructional program, I have formed some fairly strong convictions about programmed instruction. Several of these, I believe, are worth presenting here. Accordingly, the following remarks will reveal some of the author's attitudes concerning programmed instruction, attitudes which were developed during his role as principal investigator of this project.

1) Any detailed, extensive, self-instructional, programmed course should be designed to carry out two equally important functions; it should perform two basic tasks. First, it should present its content to the student in a clear, simple, easy-to-understand, step-by-step fashion and it should require the student to answer questions about the material to ensure that it has been perceived and understood. That is the first task -- getting the message to the student. It is the better known of the two functions of programmed instruction. The second task is to make the student do whatever is necessary to bring about the efficient learning and long retention of the material, that is, the program should make the student study, rehearse, or practice the material so that good learning and retention will result. A clear presentation

of the material is not enough. A psychologist, familiar with the literature on human learning, observing a student at work on a programmed course, should be prompted to say: "He certainly is going to learn that material well. The program is making him do exactly what he should be doing for good learning and long retention." A program should not only teach, it should also guide the student in his studying.

2) A programmed course will not solve the "motivation problem." If a student does not want to study, a programmed course is not going to trap him into it. Relative to many other activities, learning is aversive; there are many other activities that are more pleasant than studying. If we have a student who is anxious to learn and if we have a suitable program, then it is quite likely that the student can spend his time efficiently working on the program. But the feedback of information about accuracy of response and a high degree of success in the learning situation, while they might constitute a more efficient learning environment than the typical classroom, nevertheless are not adequate in themselves to keep the student who has any choice in the matter, coming back to work on the program. This fact contradicts what is usually contained in descriptions of programmed instruction. Just as the teacher can not teach the student who will not come to class, so the programmed text cannot teach the student who will not turn the pages.

3) A programmed course must sooner or later face the problem of individual differences. Not all individuals need the same amount of practice to promote the same high degree of retention. Unless a

program exists in many forms or can be modified easily to accommodate individual differences in ability, it will not have great utility. Neither the common linear format nor the common branching format has handled the problem satisfactorily. With the typical linear format, if a student reveals existing knowledge about one section of a program by performing almost flawlessly on that section, he is, somewhat illogically, skipped over a different part of the program which he may or may not be familiar with. And with the typical branching format, the important practice function of the program is slighted while the presentation function is emphasized. If a student can answer the first question about a problem, he is immediately switched to a new problem. It is only the student who is not immediately successful who has several exposures of the same material.

4) Tabulating errors is not a satisfactory way to get information about the adequacy of specific frames in extensive programs. Early accounts of programmed instruction, and some current ones, too, point out that not only does the student get immediate feedback about the accuracy of his responses, but the programmer, also, gets feedback from the students about the adequacy of the program. If a sizeable number of students answer a particular question incorrectly, the question is either modified or replaced. While this technique for evaluating frames may be a satisfactory procedure with brief programs where a large number of subjects can be easily and quickly run through the program, it is not a practical procedure with extensive programs where only a few subjects can be used because of the great amounts of time involved. A much more satisfactory way to get the same kind of

information is to ask the students of the program directly to comment on the suitability of the items.

5) The development of successful self-instructional programs may create more problems than it solves. Programmed instruction is not a panacea for all of education's ills. For every problem it solves at the pedagogical level a new one may be introduced at the administrative level. Originally, when programmed instruction was discussed, the question was often asked: "What will be left for the teacher to do?" Soon the teacher discovered that he would have plenty to do. Now the question is: "When will he do it?" With students going at their own rates, they all finish their programs at different times. And so now the teacher finds that he not only has plenty to do, but he has to do it over and over again. As a consequence, unless there is a radical change in the concept of the class room, the teacher may be worse off than he was before he was "helped out" by programmed instruction!

Summary

The purpose of our project was to construct a completely self-instructional, programmed, first semester, college course in Russian. It was hoped that the development of the program would (1) make available a course which would be suitable for use in high schools and colleges where Russian teachers were not available, (2) provide a useful research tool for studying the learning and teaching of second languages, and (3) yield information about the development of extensive, self-instructional programmed courses.

We have completed the development of the course and it is currently being evaluated. The first half of the program has been

duplicated and is being tested at the University of Washington in Seattle where 16 students have enrolled in the course in the Informal (non-credit) Section of the Division of Continuing Education. The second half of the course exists as one copy only and is being tested on an individual volunteer basis at Indiana University. Written and oral achievement tests based on the course content and administered after each third of the course are being used to evaluate the program.

Although the entire program has not as yet been used to conduct any experimental investigations of second language learning, five brief studies have been conducted using a short section of the first part of the program.

In the course of the project we developed a modification of the typical linear programmed format. Our modified form appears to be superior to the regular linear format in several respects.

Our program consists of both taped and printed material. It is designed to teach the student to understand, speak, read and write Russian at the level of a student who has successfully completed a first semester college course in Russian. The program is neither completely traditional nor completely audio-lingual in its approach. An attempt was made to combine the two approaches and derive the benefits of both. The first contact that our students have with any new lexical item is to hear it pronounced on tape by a native Russian speaker. But immediately after they learn to mimic the pronunciation of an item, they learn to spell it. Also, although our students have a substantial amount of pattern practice or structural drill, grammar is not slighted; they are taught the relevant grammatical

rules before they begin their pattern practice. They do not substitute items repeatedly in the same patterns, but start each response with a new pattern. A substantial amount of translating, both orally and in writing, is required of our students.

There are 306 separate tapes in the program. They vary in running time from five minutes to forty minutes with an average of approximately 20 minutes. There are 97.5 hours of taped material in all, but since most students listen to parts of the tapes more than once, the listening time may substantially exceed this figure. The printed material is in programmed textbook form and consists of approximately 15,000 frames. The printed material and the tapes cover the same content, but with different emphases. The text stresses reading, writing and spelling; the tapes stress listening and speaking. In using the program, the student, working alone in a partially soundproofed booth, repeatedly switches back and forth between the text and the tape; occasionally he uses both together.

The program contains 266 lexical items, roughly divided into grammatical categories as follows: 124 nouns, 63 verbs and 79 other items, primarily pronouns and adverbs, but including other parts of speech. The tally does not include more than one inflectional form of any item.

When the student completes the program, which requires about 245 hours of study time, he is capable of understanding and producing both orally and in writing, Russian sentences of the complexity of the following examples: (1) I'll sign all those documents and then finish answering the mail. (2) Our husbands will inquire about that man's business when they are at work today.